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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,995	05/26/2006	Young-Duck Lee	11281-105-999	9459

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EXAMINER	
FLANIGAN, ALLEN J	
ART UNIT	PAPER NUMBER
3744	
MAIL DATE	DELIVERY MODE
06/09/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/580,995	LEE ET AL.	
	Examiner	Art Unit	
	Allen J. Flanigan	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/07-3/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The wording of claim 11 "having a structure that wick structure and coarse mesh layer are laminated with being opposite to each other" is confusing and not understood.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6, 10, 11, 24-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Rosenfeld et al.

Rosenfeld shows a planar heat exchanger in which a coarse wire wick is sandwiched between two wick structures. The coarse wire wick in the given example has a mesh number of 10 (see lines 1-15 of column 3 of Rosenfeld). Note also that Rosenfeld et al. disclose that "One or more layers of fine mesh screen can also serve as wick layers" (lines 25-28 of column 3). Note lines 1-5 of column 3 regarding claim 10.

Regarding claim 26, see lines 10-15 of column 2 of Rosenfeld et al.

Claims 12, 20-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Arimoto et al.

Arimoto et al. disclose a flat heat pipe structure with metal foils bonded at the edges enclosing wire mesh wick structures, including an embodiment in which mesh layers of different porosity or mesh number are combined (see paragraphs 16 and 22 of the translation).

Claims 20 and 21 merely recite an inherent property of the fine and coarse mesh layers disclosed in Arimoto et al. Regarding claim 22, the application of a vacuum to the thin foils forming the envelope of Arimoto et al. (as thin as two mils) that sandwich the mesh layers will inevitably form an uneven surface as the foil is pressed inward against the surface of the mesh.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3-7 and 11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimoto et al. in view of Madsen.

It is known in the art that controlling the mesh pore size (mesh number or coarseness and wire diameter) is recognized to be a result effective variable. See Madsen column 2. Madsen also disclose the method of providing a course mesh layer providing for vapor passages within the heat pipe, with a specific example of a mesh having a mesh number of 16. Thus, it would have been obvious to one of ordinary skill in the art to optimize the mesh number and

wire diameter of the mesh aggregates taught in Arimoto et al. See MPEP 2144.05 II.

Regarding claims 16 and 17, note that Arimoto et al. suggest a laminate of "two or more sheets" (see paragraphs 16 and 25) of meshes of different number; Madsen shows that it is known to alternate fine and coarse mesh layers.

Claims 8, 27-29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenfeld et al.

Rosenfeld et al. note that sintered wick structures are known in the art (see lines 1-15 of column 1). It would have been an obvious substitution of known elements to employ sintered wick layers in place of the wick layers 24 of Rosenfeld et al., particularly since lack of flexibility is the main reason Rosenfeld et al. employ felting for the wicking layers 24. One of ordinary skill in the art would appreciate that there are many applications for heat pipes such as electronic chip cooling in which flexibility of the planar heat pipe is unnecessary.

Regarding claim 27, all of the fluids listed in this claim are well known as heat pipe refrigerants, and the Examiner takes Official Notice of this fact. See In re Malcolm, 54 U.S.P.Q. 235. It would have been obvious to one of ordinary skill in the art at the time the instant invention was made to use any of these materials as the working fluid of the heat pipe of Rosenfeld et al.

Claims 9 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimoto et al. in view of Yamamoto et al.

It is known in the art as taught by Yamamoto et al. to form a capillary/wicking layer by etching an inside surface of a planar heat pipe (see the Fig. 16a embodiment), and it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to substitute such etched capillary grooves for the outermost mesh layers of the combined mesh stack of Arimoto et al., such being no more than the substitution of equivalents.

Claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimoto et al. in view of Rosenfeld et al.

Both Arimoto et al. and Rosenfeld et al. suggest the use of plural layers of mesh of differing coarseness as noted above; Rosenfeld et al.'s suggestion that the copper felt layers can be replaced by "one or more layers" of fine mesh suggest variations such as claimed in the above claims with two layers of fine mesh on the top and/or bottom surface of the stack of mesh layers. Rosenfeld also disclose the feature of alternating coarse and fine wicking structures in the form of mesh layers. The particular number and order of the layers claimed in the above claims appears to be an obvious matter of design choice; the fact that so many variations are being claimed suggests that there is nothing particularly critical in any of the claimed arrangements by itself. It would have been obvious to one skilled in the art to add additional coarse layers to provide

the necessary vapor flow space, or vary the number and location of the fine mesh layers depending on the liquid flow and wicking requirements of a particular application.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The remaining references cited show various heat pipe designs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen J. Flanigan whose telephone number is (571) 272-4910. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allen J. Flanigan/
Primary Examiner, Art Unit 3744